9R4
86-14

FOREST PEST MANAGEMENT
Pacific Southwest Region

Report No. 86-14

3420 Biological Evaluations
August 8, 1986

PSW FOREST AND RANGE EXPERIMENT STATION
SEP 30 1986
STATION LIBRARY COPY

TREE MORTALITY ASSOCIATED WITH A HIGH WATER TABLE, OAK KNOLL RANGER DISTRICT, KLAMATH NATIONAL FOREST

John W. Dale, Entomologist
Gregg DeNitto, Forest Pathologist

ABSTRACT

An upslope wildfire in 1978 and recent above average precipitation appeared responsible for a rise in the water table over 300 acres in the Middle Creek drainage, Oak Knoll Ranger District, Klamath National Forest. This has weakened trees of four species and made them susceptible to attack by a variety of insects in the genera Dendroctonus, Ips, Melanophila, and Phloeosinus. Mortality is likely to continue until susceptible trees are eliminated or the water table subsides.

INTRODUCTION

On June 10, we accompanied Bill Van Vliet and Lynda Karns, Oak Knoll Ranger District, to a location in the Middle Creek Drainage at T. 47 N., R. 3 W., Sec. 32 & 33, where pronounced tree mortality of several species was occurring over 300 acres. The district suspected a change in the level of the water table and possibly, black stain root disease as being responsible for the mortality.

OBSERVATIONS

Mortality has occurred in pole-size and larger trees over the past 3 to 4 years and merchantable trees have been salvaged. Ponderosa pine and Douglas-fir are the most common species in the area and comprise the majority of the mortality. Sugar pine and incense-cedar also are involved and some oaks appear in an early state of decline.

Pine engravers, Ips sp., were causing mortality of small ponderosa pine and killing the tops of large pines. Red turpentine beetle, Dendroctonus valens, occurred at the base of most of the large pines under attack by engravers. Some red turpentine beetle attacks occurred 4 feet above the soil line — an indication that the host trees were stressed prior to colonization by the beetles. The western pine beetle, D. brevicomis, was attacking the boles of the large pines below the tops killed by the engravers, but attacks were not

always present on the lower bole. Mountain pine beetle, D. ponderosae, was found in sugar pine. The initial portion of the egg galleries were atypical — they wandered several inches across the grain before turning upward along the grain. The density of attacks did not appear to account for this wandering, and the sugar pine may have been less stressed and more resistant to attack by bark beetles than the ponderosa pine.

Mines of the flatheaded fir borer, Melanophila drummondi, were found on the lower bole of dead Douglas-fir. No doubt, twig beetles, including the Douglas-fir engraver, Scolytus unispinosus, occurred in the branches of such trees. Galleries of cedar bark beetles, Phloeosinus sp., were common on the dead and dying incense-cedar. These beetles generally are not aggressive and are commonly found on weakened, dying, or felled trees.

Examination of several ponderosa pines, sugar pines,and Douglas-firs did not reveal evidence of any root disease. Black stain root disease does not appear to be involved with the current mortality.

It is unusual to find mortality occurring in several tree species over such a small area. A site or climatic factor often links such a phenomenon. In this case it is a rise in the water table, which now is near the surface in some areas. Water was seeping from the ground at some changes in slope, horsetails have become established in some locations, and the soil had a wet, heavy consistency where it had been freshly exposed by machinery. Pits were not dug, but soil color of this exposed soil suggested that soil aeration probably was poor, or certainly degraded from previous years. Numerous seedlings of all the conifer species had become established in the openings created by mortality and had attained two or more years of growth. A quick return of the water table to former levels might not be favorable for the continued survival and good growth of many of these seedlings.

DISCUSSION

In 1978 the Buckhorn Burn occurred on the ridge above the 300 acres. It seems probable that subsurface water is moving down slope in excessive quantity because of insufficient vegetative cover to intercept and transpire a portion of the moisture. This infiltration and movement should lessen as new vegetation attains greater coverage, age and size.

In addition to the burn upslope, precipitation has been above average on the district since the beginning of the winter of 1982-83. This would add an even greater volume of water moving down slope from the burn.

MANAGEMENT ALTERNATIVES

1. No Action. Tree mortality will continue until the stressed trees are eliminated or the water table returns to the previous level. This is unlikely to occur until precipitation levels return to historic norms and the area of the Buckhorn Burn has sufficient vegetation to reduce downslope water movement. ((Even if subsequent precipitation levels are normal, it is unlikely that the water table will subside greatly until the upslope area of the Bucknorn Burn has sufficient vegetation to reduce downslope water movement.))

Root systems will not immediately recover with a return of the water table to the previous level and tree mortality should continue for several years thereafter.

2. Salvage. This will not relieve the stress created by the rise in the water table, but it will capture some of the mortality volume from the 300 acres. Removal of green trees along with the salvage would remove transpiring vegetation and might aggravate the problem. On the other hand, new conifer seedlings appeared to be doing well in openings created thus far.

3. Mosaic of Patch Cuts. The level of the water table is not uniform over the entire area. At those sites where it is highest and mortality greatest, it may be feasible to capture the value of the timber and take advantage of the soil moisture to establish regeneration. The new crop should be able to adapt to a subsiding water table when that occurs.

4. Lower the Water Table. None of the above alternatives will prevent mortality. Only lowering the water table will do that because the insects are benefiting from the stress created by the change in soil conditions. Soil scientists or hydrologists should be consulted as to methods and feasibility of modifying the current high level of the water table. They could also advise as to possible contributions of impermeable soil layers, perched water tables, or other conditions to the current level. A quick return of the water table to former levels might not be favorable for the continued survival and good growth of many of the seedlings that have recently become established in the openings created by the mortality.